

STANLEY G. BENJAMIN - Curriculum Vitae - May 2012

EDUCATION

Ph.D. Meteorology (1983), Pennsylvania State University, University Park, PA

M.S. Meteorology (1980), Pennsylvania State University, University Park, PA

B.A. Mathematics (1973), Albion College, Albion, Michigan

EXPERIENCE:

Current position

- Chief, Assimilation and Modeling Branch (AMB), Global Systems Division, NOAA Earth Systems Research Laboratory, Boulder, Colorado
 - AMB is the development group for RUC (Rapid Update Cycle), Rapid Refresh, and HRRR (High-Resolution Rapid Refresh) regional models, and the FIM global model. All of these models are currently or planned to be operational models at NOAA/NWS/NCEP.
 - Various Branch Chief positions (5/92-present) and Research Meteorologist (4/90-present)
- Directing development of the global icosahedral isentropic atmospheric model (FIM – *Flow-following finite-volume Icosahedral Model*) at NOAA, 2005-present.
- Lead for Global Modeling Team for the NOAA HFIP (*Hurricane Forecast Improvement Project*)
- Directed development of the RUC, an operational data assimilation/numerical forecast system running at the NWS National Centers for Environmental Prediction (NCEP) that provides analyses and short-range forecasts at high frequency (every 1h) using asymptotic observations.
- Developed, with other scientists, objective analysis techniques and numerical prediction models for use in RUC, including radar assimilation technique implemented at NCEP (Nov 2008). Performed research on data assimilation methods (3DVAR and optimal interpolation) for in situ and remotely sensed observations, model numerics and parameterizations. Directed projects on RUC applications for aviation, severe weather forecasting, regional climate simulations and land-surface modeling, wind energy forecasting.
- Co-directing development of HRRR model (3km *High-Resolution Rapid Refresh*, updated hourly with radar reflectivity assimilation over US)
- Directing development of WRF-based Rapid Refresh planned to replace RUC in 2012.
- Research scientist (6/83-4/90) employed by: National Center for Atmospheric Research, Boulder, Colorado working at NOAA, Boulder, CO (formerly PROFS). Performed research on the effects of terrain and soil moisture distribution on short-range forecasts of the regional environment for severe convective storms using the Penn State/NCAR mesoscale model. Studied impact of terrain on local circulations using same model. Developed multivariate optimal interpolation schemes in isobaric and

isentropic coordinates for use in earlier versions of MAPS (development version of RUC), and implemented first versions of MAPS intermittent data assimilation system.

OTHER POSITIONS, HONORS:

- Fellow – Cooperative Institute for Research in Environmental Sciences (CIRES, Boulder, CO) (2011)
- Fellow - American Meteorological Society (2004)
- U.S. Department of Commerce Bronze Medals: 1998, 2010
- U.S. Department of Commerce Gold Medal: 2006
- NOAA Research Paper of Year Awards, lead author – 2006, 1st co-author – 2008
- Lead for FAA Model Development and Enhancement Research Team (2006-present).
- Member of FAA Aviation Weather Forecasting Task Force, 1985-1987

REFEREED PUBLICATIONS

1. Bleck, R., S. Benjamin, J.-L. Lee, A.E. MacDonald; **2010**: On the use of an adaptive, hybrid-isentropic vertical coordinate in global atmospheric modeling. *Mon. Wea. Rev.*, **138**, 2188-2210.
2. Benjamin, S.G., B.D. Jamison, W.R. Moninger, S. R. Sahm, B. Schwartz, T.W. Schlatter, **2010**: Relative short-range forecast impact from aircraft, profiler, radiosonde, VAD, GPS-PW, METAR, and mesonet observations via the RUC hourly assimilation cycle. *Mon. Wea. Rev.*, **138**, 1319-1343.
3. Moninger, W.R., S.G. Benjamin, B.D. Jamison, T.W. Schlatter, T.L. Smith, and E.J. Szoke, **2010**: Evaluation of regional aircraft observations using TAMDAR. *Wea. Forecasting*, **25**, 647-655.
4. Pondeca, M.S.F.V. de , G.S. Manikin, G. DiMego, S.G. Benjamin, D.F. Parrish, R.J. Purser, W.-S. Wu, J. Horel, Y. Lin, R.M. Aune, D. Keyser, L. Anderson, B. Colman, G. Mann, and J. Vavra, **2010**: The Real-Time Mesoscale Analysis at NOAA's National Centers for Environmental Prediction: Current Status and Development. Submitted to *Wea. Forecasting*
5. Stensrud, D., M. Xue, L. Wicker, K. Kelleher, M. Foster, J. Schaefer, R. Schneider, S. Benjamin, S. Weygandt, J. Ferree, J. Tuell, 2009: Convective-scale Warn-on-Forecast: A Vision for 2020. *Bull. Amer. Meteor. Soc.*, **90**, 1487-1499. doi: 10.1175/2009BAMS2795.1
6. Smith, T.L., S.G. Benjamin, S.I. Gutman, and S. Sahm, **2007**: Short-range forecast impact from assimilation of GPS-IPW observations into the Rapid Update Cycle. *Mon. Wea. Rev.*, **135**, 2914-2930. (NOAA Research Paper of Year Award – 2008)
7. Lu, C., H. Yuan, B.E. Schwartz, and S.G. Benjamin, **2007**, Short-range numerical weather prediction using time-lagged ensembles, *Wea. Forecasting*, **22**, 580-595.
8. Stensrud, D.J., N. Yussouf, M.E. Baldwin, J.T. McQueen, J. Du, B. Zhou, B. Ferrier, G. Manikin, F.M. Ralph, J.M. Wilczak, A.B. White, I. Djalalova, J. Bao,

- R. Zamora, S. Benjamin, P.A. Miller, T.L. Smith, T. Smirnova, M. F. Barth, **2006**: The New England High-Resolution Temperature Program. *Bull. Amer. Meteor. Soc.*, **87**, 491-498.
9. Benjamin, S.G., D. Devenyi, S.S. Weygandt, K.J. Brundage, J.M. Brown, G. Grell, D. Kim, B.E. Schwartz, T.G. Smirnova, T.L. Smith, G.S. Manikin, **2004**: An hourly assimilation/forecast cycle: the RUC. *Mon. Wea. Rev.*, **132**, 495-518. (NOAA Research Paper of Year Award – 2006).
 10. Benjamin, S.G., G.A. Grell, J.M. Brown, T.G. Smirnova, and R. Bleck, **2004**: Mesoscale weather prediction with the RUC hybrid isentropic/terrain-following coordinate model. *Mon. Wea. Rev.*, **132**, 473-494.
 11. Benjamin, S.G., B.E. Schwartz, E.J. Szoke, and S.E. Koch, **2004**: The value of wind profiler data in U.S. weather forecasting. *Bull. Amer. Meteor. Soc.*, **85**, 1871-1886.
 12. Benjamin, S.G., B.E. Schwartz, E.J. Szoke, and S.E. Koch, **2004**: The value of wind profiler data in U.S. weather forecasting. Case studies. (online supplement). *Bull. Amer. Meteor. Soc.*, **85**, E21-E29.
 13. Devenyi, D., and S.G. Benjamin, **2003**: A 3-dimensional atmospheric variational assimilation technique in a hybrid isentropic-sigma coordinate. *Meteor. and Atmospheric Physics*, **82**, 245-257.
 14. Gutman, S.I. and S.G. Benjamin, **2001**: The role of ground-based GPS meteorological observations in numerical weather prediction. *GPS Solutions*, **4**, 16-24.
 15. Schwartz, B.E., S.G. Benjamin, S.M. Green, and M.R. Jardin, **2000**: Accuracy of RUC-1 and RUC-2 wind and aircraft trajectory forecasts by comparison with ACARS observations. *Wea. Forecasting*, **15**, 313-326.
 16. Smirnova, T.G., J.M. Brown, S.G. Benjamin, and D. Kim, **2000**: Parameterization of cold-season processes in the MAPS land-surface scheme. *J. Geophys. Res.*, **105**, D3, 4077-4086.
 17. Smith, T.L., S.G. Benjamin, B.E. Schwartz, and S.I. Gutman, **2000**: Using GPS-IPW in a 4-D data assimilation system. *Earth, Planets, and Space*, **52**, 951-956.
 18. Berbery, E.H., K. Mitchell, S. Benjamin, T. Smirnova, H. Ritchie, R. Hogue, and E. Radeva, **1999**: Assessment of land-surface energy budgets from regional and global models. *J. Geophys. Res.*, **104**, , 19329-19348.
 19. Benjamin, S.G., B.E. Schwartz, and R.E. Cole, **1999**: Accuracy of ACARS wind and temperature observations determined by collocation. *Wea. Forecasting*, **14**, 1032-1038.

20. Smirnova, T.G., J.M. Brown, and S.G. Benjamin, **1997**: Performance of different soil model configurations in simulating ground surface temperature and surface fluxes. *Mon. Wea. Rev.*, **125**, 1870-1884.
21. Westphal, D.L., S. Kinne, J.M. Alvarez, P. Minnis, D.F. Young, S.G. Benjamin, W.L. Eberhard, R.A. Kropfli, S.Y. Matrosov, J.B. Snider, T.A. Uttal, A.J. Heymsfield, G.G. Mace, S.H. Melfi, D.O'C. Starr, and J.J. Soden, **1996**: Initialization and validation of a simulation of cirrus using FIRE-II data. *J. Atmos. Sci.*, **53**, 3397-3429.
22. Schwartz, B., and S. G. Benjamin, **1995**: A comparison of temperature and wind measurements from ACARS-equipped aircraft and rawinsondes. *Wea. Forecasting*, **11**, 528-544.
23. Pan, Z.-T., S. G. Benjamin, J. M. Brown, and T. G. Smirnova, **1994**: Comparative experiments with MAPS on different parameterization schemes for surface moisture flux and boundary-layer processes. *Mon. Wea. Rev.*, **122**, 449-470.
24. Schlatter, T. W., and S. G. Benjamin, **1994**: A mesoscale data assimilation system adapted for trajectory calculations over Alaska. U.S. Geological Survey Bulletin, **2047**, 269-276.
25. Bleck, R., and S. G. Benjamin, **1993**: Regional weather prediction with a model combining terrain-following and isentropic coordinates. Part I: model description. *Mon. Wea. Rev.*, **121**, 1770-1785.
26. Benjamin, S. G., T. L. Smith, P. A. Miller, D. Kim, T. W. Schlatter, D. Dévényi, J.-M. Carrière, R. Bleck, **1993**: Recent developments in the MAPS isentropic-sigma data assimilation system. *Időjárás*, **97**, 1-19.
27. Smith, T. L., and S. G. Benjamin, **1993**: Impact of network profiler data on a 3-h data assimilation system. *Bull. Amer. Meteor. Soc.*, **74**, 801-807.
28. Miller, P.A., and S.G. Benjamin, **1992**: A system for the hourly assimilation of surface observations in mountainous and flat terrain. *Mon. Wea. Rev.*, **120**, 2342-2359.
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30. Benjamin, S. G., and P. A. Miller, **1990**: An alternate sea-level pressure reduction and a statistical comparison of surface geostrophic wind estimates with observed winds. *Mon. Wea. Rev.*, **118**, 2099-2116.
31. Benjamin, S. G., **1989**: An isentropic meso-alpha scale analysis system and its sensitivity to aircraft and surface observations. *Mon. Wea. Rev.*, **117**, 1586-1603.
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33. Benjamin, S. G. and T. N. Carlson, **1986**: Some effects of surface heating and topography in the regional severe storm environment. Part I: three-dimensional simulations. *Mon. Wea. Rev.*, **114**, 307-329.
34. Benjamin, S. G., **1986**: Some effects of surface heating and topography on

- the regional severe storm environment. Part II: two-dimensional idealized experiments. *Mon. Wea. Rev.*, **114**, 330-343.
35. Benjamin, S. G. and N. L. Seaman, **1985**: A simple scheme for objective analysis in curved flow. *Mon. Wea. Rev.*, **113**, 1184-1198.
 36. Carlson, T. N., S. G. Benjamin, G. S. Forbes and Y.-F. Li, **1983**: Elevated mixed layers in the regional severe storm environment: Conceptual model and case studies. *Mon. Wea. Rev.*, **111**, 1453-1473.
 37. Anthes, R. A. Y.-H. Kuo, S. G. Benjamin and Y.-F. Li, **1982**: The evolution of the mesoscale environment of severe local storms: preliminary modeling results. *Mon. Wea. Rev.*, **110**, 1187-1213.
 38. Carlson, T. N., J. K. Dodd, S. G. Benjamin and J. N. Cooper, **1981**: Satellite estimation of the surface energy balance, moisture availability and thermal inertia. *J. Appl. Meteor.*, **20**, 67-87.
 39. Carlson, T. N. and S. G. Benjamin, **1980**: Radiative heating rates for Saharan dust. *J. Atmos. Sci.*, **37**, 193-213.
 40. Carlson, T. N., R. A. Anthes, M. Schwartz, S. G. Benjamin and D. G. Baldwin, **1980**: Analysis and prediction of severe storms environment. *Bull. Amer. Meteor. Soc.*, **61**, 1018-1032.

DISSERTATIONS AND THESES

1. Benjamin, S. G., 1983: Some effects of surface heating and topography in the regional severe storm environment. Ph.D. dissertation, the Pennsylvania State University, 265 pp.
2. Benjamin, S. G., 1980: Radiative effects of Saharan dust. M.S. thesis, the Pennsylvania State University, 99 pp.

NON-REFEREED PUBLICATIONS:

1. Lee, J.L., R. Bleck, A.E. MacDonald, J.W. Bao, S. Benjamin, J. Middlecoff, N. Wang, J. Brown, **2008**: FIM: A vertically flow-following, finite-volume icosahedral model., Preprints, 22nd Conf. Wea. Analysis Forecasting / 18th Conf. Num. Wea. Pred., Park City, UT, Amer. Meteor. Soc.
2. Smith, T. L., S. G. Benjamin, J. M. Brown, S. Weygandt, T. Smirnova, B. Schwartz; **2008** Convection Forecasts from the Hourly Updated, 3-KM High Resolution Rapid Refresh (HRRR) Model *24th Conference on Severe Local Storms*, Savannah, GA, AMS [PDF](#)
3. Benjamin, S. S., S. S. Weygandt, J. M. Brown, T. Smirnova, D. Devenyi, K. Brundage, G. Grell, S. Peckham, W. R. Moninger, T. W. Schlatter, T. L. Smith, G. Manikin **2008** Implementation of the Radar-Enhanced RUC *13th Conf. Aviation, Range and Aerospace Meteorology*, Amer. Meteor. Soc., New Orleans, LA
4. Benjamin, S. S., B. D. Jamison, W. R. Moninger, B. Schwartz, T. W. Schlatter **2008** Relative Forecast Impact from Aircraft, Profiler, Rawinsonde, VAS, GPS-PW, METAR, and Mesonet Observations for Hourly Assimilation in the RUC *12th Conference on IOAS-AOLS*, Amer. Meteor. Soc., New

- Orleans, LA
5. Brown, J. M., T. G. Smirnova, S. G. Benjamin, B. Jamison, S. S. Weygandt **2008 Rapid-refresh testing: Examples of Forecast Performance** *13th Conf. Aviation, Range and Aerospace Meteorology, Amer. Meteor. Soc.*, New Orleans, LA
 6. Moninger, W. R., S. G. Benjamin, B. D. Jamison, T. W. Schlatter, T. L. Smith, E. J. Szoke **2008 New TAMDAR Fleets and their Impact on Rapid Update Cycle (RUC) Forecasts** *Conf. Aviation, Range and Aerospace Meteorology, Amer. Meteor. Soc.*, New Orleans, LA
 7. Szoke, E. J., S. Benjamin, R. S. Collander, B. D. Jamison, W. R. Moninger, T. W. Schlatter, B. Schwartz, T. L. Smith **2008 Effect of TAMDAR Data on RUC Short-Term Forecasts of Aviation-Impact Fields for Ceiling, Visibility, Reflectivity, and Precipitation** *13th Conf. Aviation, Range and Aerospace Meteorology, Amer. Meteor. Soc.*, New Orleans, LA
 8. Weygandt, S. S., S. G. Benjamin, T. G. Smirnova, J. M. Brown **2008 Assimilation of Radar Reflectivity Data Using a Diabatic Digital Filter Within the Rapid Update Cycle** *12th Conference on IOAS-AOLS, Amer. Meteor. Soc.*, New Orleans, LA
 9. Weygandt, S. S., S. G. Benjamin, M. Hu, T. G. Smirnova, J. M. Brown **2008 Use of Lightning Data to Enhance Radar Assimilation Within the RUC and Rapid Refresh Models** *3rd Conf. Meteorological Applications of Lightning Data, Amer. Meteor. Soc.*, New Orleans, LA
 10. Weygandt, S. S, S. G. Benjamin, T. G. Smirnova, J. M. Brown, K. Brundage **2008 Hourly Convective Probability Forecasts and Experimental High-Resolution Predictions Based on the Radar Reflectivity Assimilating RUC Model** *13th Conf. Aviation, Range and Aerospace Meteorology, Amer. Meteor. Soc.*, New Orleans, LA
 11. Benjamin, S. G., J. M. Brown, G. Manikin, G. Mann **2007 The RTMA Background – Hourly Downscaling of RUC Data to 5-KM Detail** *23rd Conference on IIPS, Amer. Met. Soc.*, San Antonio, TX; and *22nd Weather Analysis and Forecasting Conf.* *18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
 12. Benjamin, S.G., S.S. Weygandt, J.M. Brown, T.G. Smirnova, D. Devenyi, K. Brundage, G.A. Grell, S. Peckham, T. Schlatter, T.L. Smith, G. Manikin **2007: From the radar-enhanced RUC to the WRF-based Rapid Refresh.** *22nd Weather Analysis and Forecasting Conf.* *18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
 13. Benjamin, S. G., W. R. Moninger, S. R. Sahm, T. L. Smith, **2007 Mesonet Wind Quality Monitoring Allowing Assimilation in the RUC and Other NCEP Models** *22nd Weather Analysis and Forecasting Conf.* *18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
 14. Benjamin, S. G., W. R. Moninger, T. L. Smth, B. D. Jamison, E. J. Szoke, T. W. Schlatter **2007 2006 TAMDAR Impact experiment Results for RUC Humidity, Temperature, and Wind Forecasts** *11th Symposium on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), Amer. Meteor. Soc.*, San Antonio, TX

15. Brown, J.M., S. Benjamin, T. Smirnova, G. Grell, L. Bernardet, L. B. Nance, R. Collander, and C. Harrop. **2007** Rapid Refresh Core Test: Aspects of WRF-NMM and WRF-ARW Forecast Performance Relevant to the Rapid Refresh Application. *22nd Conf. Wea. Analysis Forecasting 18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
16. Devenyi, D., S. S. Weygandt, T. W. Schlatter, S. G. Benjamin, M. Hu **2007** Hourly Data Assimilation with the Gridpoint Statistical Interpolation for the Rapid Refresh *22nd Conf. Wea. Analysis Forecasting 18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
17. Lee, J. L., R. Bleck, A. E. MacDonald, J. -W. Bao, S. G. Benjamin, J. Middlecoff, N. Wang, J. Brown **2007** FIM: A Vertically Flow-Following, Finite-Volume Icosahedral Model *22nd Conf. Wea. Analysis Forecasting 18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
18. Moninger, W. R., S. G. Benjamin, B. D. Jamison, T. W. Schlatter, T. L. Smith, E. J. Szoke **2007** TAMDAR and its Impact on Rapid Update Cycle (RUC) Forecasts *22nd Conf. Wea. Analysis Forecasting 18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
19. Moninger, W. R., S. G. Benjamin, R. S. Collander, B. D. Jamison, T. W. Schlatter, T. L. Smith, E. J. Szoke **2007** TAMDAR/AMDAR Data Assessments Using the RUC at NOAA's Global Systems Division *11th Symposium on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS)*, Amer. Meteor. Soc., San Antonio, TX
20. Szoke, E. J., R. S. Collander, B. D. Jamison, S. G. Benjamin, W. R. Moninger, T. W. Schlatter, B. Schwartz **2007** Impact of TAMDAR Data on RUC Short-Range Forecasts *22nd Conf. Wea. Analysis Forecasting 18th Conf. Num. Wea. Pred., Amer. Meteor. Soc.*, Park City, UT
21. Szoke, E. J., S. G. Benjamin, R. S. Collander, B. D. Jamison, W. R. Moninger, T. W. Schlatter, T. L. Smith **2007** Impact of TAMDAR on the RUC Model: A Look Into Some of the Statistics *11th Symposium on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS)*, Amer. Meteor. Soc., San Antonio, TX
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23. Moninger, W.R., S.G. Benjamin, D. Devenyi, B.D. Jamison, B.E. Schwartz, T.L. Smith, and E. Szoke, **2006**: AMDAR optimization studies at the Global Systems Division. *10th Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land Surface (IOAS-AOLS)*, Atlanta, GA, Amer. Meteor. Soc., CD-ROM, 2.4a.
24. Moninger, W.R., M.F. Barth, S.G. Benjamin, R.S. Collander, B.D. Jamison, P.A. Miller, B.E. Schwartz, T.L. Smith, and E. Szoke, **2006**: TAMDAR evaluation work at the Forecast Systems Laboratory: An overview. *10th Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land Surface (IOAS-AOLS)*, Atlanta, GA, Amer.

- Meteor. Soc., CD-ROM, 9.7.
25. Smith, T.L., S.G. Benjamin, S.I. Gutman, S. Sahm, and K. Holub, **2006**: Operational assimilation of GPS-IPW observations in the 13-km RUC at NCEP. 10th Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land Surface (IOAS-AOLS), Atlanta, GA, Amer. Meteor. Soc., CD-ROM, 2.2.
 26. Smith, W. L., Jr., P. Minnis, and S. G. Benjamin, **2006**: Comparison of RUC condensate analyses and forecasts with satellite-derived cloud properties. 12th Conf. on Aviation, Range, and Aerospace Meteorology (ARAM), Atlanta, GA, Amer. Meteor. Soc., CD-ROM, P5.21.
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 29. Weygandt, S. S., S. G. Benjamin, D. Devenyi, J. M. Brown, and P. Minnis, **2006**: Cloud and hydrometeor analysis using METAR, radar, and satellite data within the RUC/Rapid Refresh Model. 12th Conf. on Aviation, Range, and Aerospace Meteorology (ARAM), Atlanta, GA, Amer. Meteor. Soc., CD-ROM, 5.3.
 30. Benjamin, S.B., D. Devenyi, T. Smirnova, S. Weygandt, J.M. Brown, S. Peckham, K. Brundage, T.L. Smith, G. Grell, and T. Schlatter, **2006**: From the 13-km RUC to the Rapid Refresh. 12th Conf. on Aviation, Range, and Aerospace Meteorology (ARAM), Atlanta, GA, Amer. Meteor. Soc.
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 32. Benjamin, S. G., S. S. Weygandt, S. E. Koch, and J. M. Brown, **2006**: Assimilation of lightning data into RUC model convection forecasting. Second Conf. on Meteorological Applications of Lightning Data: Advances in Understanding of Lightning and Potential Economic and Societal Benefits, Atlanta, GA, Amer. Meteor. Soc., CD-ROM, 4.3.
 33. Benjamin, S.G., W.R. Moninger, T.L. Smith, B.D. Jamison, and B.E. Schwartz, **2006**: Impact of TAMDAR humidity, temperature, and wind observations in RUC parallel experiments. 12th Conf. on Aviation, Range, and Aerospace Meteorology (ARAM), Atlanta, GA, Amer. Meteor. Soc., CD-ROM, 4.5.
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 35. Brown, J.M., T.G. Smirnova, and S.G. Benjamin, **2006**: Performance of

- RUC13 forecasts for the AIRS-2 11 November 2003 icing case. 12th Conf. on Aviation, Range, and Aerospace Meteorology (ARAM), Atlanta, GA, Amer. Meteor. Soc., CD-ROM, 7B.6.
36. Herzegh, P., G. Wiener, R. Bankert, R. Bateman, S. Benjamin, J. Brown, J. Cowie, M. Hadimichael, M. Tryhand, and B. Weekley, **2006**: Development of FAA national ceiling and visibility products: Challenges, strategies, and progress. 12th Conf. on Aviation, Range, and Aerospace Meteorology (ARAM), Atlanta, GA, Amer. Meteor. Soc., CD-ROM, P1.17.
 37. Benjamin, S.G., T.G. Smirnova, K.J. Brundage, S.S. Weygandt, D. Devenyi, B.E. Schwartz, T.L. Smith, **2004**: Application of the Rapid Update Cycle at 10-13 km - Initial testing. Preprints 16th Conf. Num. Wea. Pred., Seattle.
 38. Benjamin, S.G., T.G. Smirnova, K.J. Brundage, S.S. Weygandt, D. Devenyi, B.E. Schwartz, T.L. Smith, **2004**: Application of the Rapid Update Cycle at 10-13 km - Initial testing. Preprints 16th Conf. Num. Wea. Pred., Seattle.
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 41. Koch, S.E., S. Benjamin, J. McGinley, J. Brown, P. Schultz, E. Szoke, T. Smirnova, B. Shaw, D. Birkenheuer, S. Albers, S. Peckham, G. Grell, **2004**: Real-time applications of the WRF model at the Forecast Systems Laboratory. Preprints 16th Conf. Num. Wea. Pred., Seattle.
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